MICROCHROMOSOMES IN APHANOSTEPHUS (COMPOSITAE)

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Previous chromosome counts reported for the genus *Aphanostephus* have shown a gametic number of 3, 4, and 5 with one exception of 4 bivalents plus 1 large univalent in a specimen of *A. ramosus* (DC.) Gray (see Table I). However, recent cytological investigation of a collection of *Aphanostephus skirrhobasis* (DC.) Trel, from Wharton Co., Texas *(E. B. Smith #254)* revealed a dimorphic configuration of 3 bivalents plus 4 microbivalents (Fig. 1) in one flower, while other flowers, even in the same head, had various numbers of microchromosomes. The most frequent

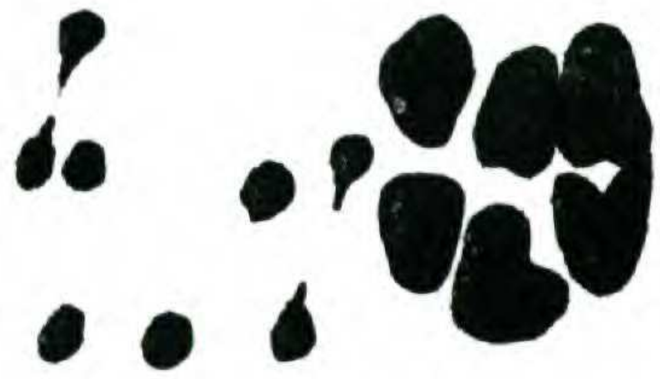

Fig. 1. Meiotic anaphase I in *Aphanthostephus skirrhobasis*, showing 8 microchromosomes. Inked-in tracing from negative, × 3200.

configuration was 3 bivalents plus 2 microbivalents and 2 microunivalents. One of the microunivalents was seen to pair with one of the "normal" bivalents in about 15 per cent of the cells observed.

Nuclear complements comprised of dimorphic chromosomes were first investigated in insects at the turn of the century by Wilson (1905). Wilson called the small chromosomes of these complements microchromosomes and defined them as "especially small" chromosomes, "irrespective of their behavior." In plants, microchromosomes were found

in monocotyledons as early as 1933 (McKelvey and Sax) and have been discussed in liverworts (Berrie, 1963). Although delimitation of the family Agavaceae has been based largely on a dimorphic chromosome set (see Cave, 1964), the phenomenon has not been generally investigated among the angiosperms.

TABLE I. — Chromosome counts reported for the genus *Aphanostephus*.

Species	n	Locality	Reported by
A. skirrhobasis	3	None cited.	Turner & Mabry (1964)
A. ramossissimus	4	S & W Texas; Hidalgo & Nuevo Leon, Mexico	Turner & Johnston (1961)
A. arizonicus	4	Pima Co., Ariz.	Raven *et al* (1960)
A. arizonicus	4	Bernalillo Co., New Mexico.	Jackson (1960a)
A. cf. pachyrrhizus	4	Puebla, Mexico	Powell & Turner (1963)
A. ramosus	4	Michoacan, Mex.	Turner *et al* (1961)
A. ramosus	4+1 univ.	Michoacan, Mex.	Powell & Turner (1963)
A. ridellii	5	None cited.	Turner & Mabry (1964)

The authors cannot equate presently the microchromosomes in *Aphanthostephus skirrhobasis* to any of the other descriptive terms used for special chromosome types, such as accessory (Müntzing, 1953) or supernumerary, defined by White (1954) as chromosomes which are present in addition to the normal karyotype, and which are not, or only partially, homologous with members of the "normal complement." The terms microchromosome and supernumerary are not mutually exclusive, since supernumerary chromosomes of a distinctly smaller size are common (e.g., *Halpopappus gracilis*, Jackson, 1960b; *H. divaricatus*, Smith, 1963).

Since the normal complement of *A. skirrhobasis* is apparently $n = 3$, aneuploidy, in the genus, is indicated. Shinners (1946) notes the occurrence of troublesome intermediates between *A. skirrhobasis* and *A. ramossissimus*, while Turner and Mabry (1964) found chromatographic profiles on these two species "almost identical." It seems probable that *A. ramossissimus*, or a similar ancestor, may have

given rise to *A. skirrhobasis* through descending aneuploidy. The microchromosomes in *A. skirrhobasis* may be evidence for aneuploidy, or hybridization between *A. skirrhobasis* and another species of *Aphanostephus*. Further study will be necessary in order to ascertain the origin and pairing behavior of the microchromosomes in *Aphanostephus*.

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